

STUDENTS' ATTITUDES TOWARD THEIR MAJOR DISCIPLINE:  
IMPLICIT VERSUS EXPLICIT MEASURE OF ATTITUDE

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## ABSTRACT

### STUDENTS' ATTITUDES TOWARD THEIR MAJOR DISCIPLINE: IMPLICIT VERSUS EXPLICIT MEASURE OF ATTITUDE

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Student satisfaction with their academic major is an important aspect of student satisfaction to explore. There were three main purposes of this study: (1) to address major satisfaction directly by comparing an explicit measure of attitude, the Academic Major Satisfaction Scale (AMSS) developed by Nauta (2007), with an implicit measure of attitude, a revision of the Affect Misattribution Procedure (AMP) developed by Payne, Cheng, Govorun, and Stewart (2005); (2) to measure major satisfaction at different levels in the college experience by using a cross-sectional design to examine how satisfaction levels differ over the duration of the college experience; and (3) to implement the AMP into the study of satisfaction. It was predicted that (1) the implicit and explicit attitudes towards the participants' major discipline will become more positive as they progress through college, (2) that the implicit measure of attitude towards their own major discipline will be more positive than towards other major disciplines, and (3) that the implicit measure of attitude towards their major discipline will be correlated with explicit measure of attitude at the same point in the college experience.

Ninety-nine students were divided into three groups based on the number of credit hours they had completed in college: Early (less than 44 credit hours,  $n=28$ ), Mid (between 45 and 89 credit hours,  $n=33$ ), and Late (greater than 90 credit hours,  $n=38$ ). The study was conducted in a group setting with the instructions, the AMP, the AMSS, and the demographics composed in a video with audio and projected in front of a classroom. All the data was collected on a Scantron form. The AMP consisted of 44 triads of primes (presented for 250 ms; including 12 iconic representations of each construction management, music and psychology and 4 of each known pleasant and unpleasant images from the International Affective Picture System (IAPS; Lang, Bradley & Cuthbert, 1995)), neutral targets (Chinese characters presented for 1 s), and a numbered filler (present for 5 s). The participants were asked to rate the neutral targets on a 4-point scale ranging from “much more pleasing than average” to “much less pleasing than average.” The AMSS consisted of the 6-item scale developed by Nauta and included the statement “I am satisfied with my academic major.” Participants were asked to rate their level of agreement with each statement on a 5-point scale ranging from “Strongly disagree” to “Strongly agree.”

Results showed that there were no significant differences in either the explicit measure of attitude or implicit measure of attitude toward various major disciplines at any level of the college experience nor did either attitude measure increase across time indicating that attitudes towards one’s major may not differ across time. Since there were no significant differences in the attitudes towards the individuals’ own major, Psychology, and other majors it is possible that psychology may be a difficult major to represent in iconic images. This would limit the use of the AMP to measure attitudes

toward this major. Finally, the explicit measure of attitude's scores did not correlate with the implicit measure of attitude's scores, indicating that this explicit measure of attitude capture a different attitude than an implicit measure of attitude.



## INTRODUCTION

Many studies have examined satisfaction. These studies have considered satisfaction with life, employment, relationships, etc. A topic of interest for some time that is gaining momentum is student satisfaction with different components of their college experience. Most of the research conducted on student satisfaction has been used for developing effective career counseling and for helping students select a major or as a review of the instructor, departmental, or institutional quality. However these studies suffer from several shortcomings.

First, most of these studies measured satisfaction indirectly. They focused on components of the educational experience, such as the challenges of the program or the quality of instruction, as a predictor or source of satisfaction. Few studies have actually directly measured college student satisfaction with their major discipline and most of these used only a single item within a larger instrument to measure satisfaction (e.g., Sherrick, Davenport, & Colina, 1970; Wachowiak, 1972; Ware & Pogge, 1980; Leong, Hardin, & Gaylor, 2005). Only one study focused on overall student satisfaction with a major while developing a valid scale to measure the degree of satisfaction (Nauta, 2007).

Second, all the studies of student satisfaction have used explicit measures of attitude to determine the level of satisfaction. These studies may be limited because explicit measures are subject to some biases. These biases include the individual's inability or unwillingness to respond accurately, and the impact of actual, implied, or imagined social desirability. Nauta (2007) acknowledged that the self-reporting measures used to validate her Academic Major Satisfaction Scale (AMSS) could have

been influenced by socially desirable responding and, therefore, may not represent the true degree of major satisfaction.

Recent research on methodologies for measuring attitudes has drawn a distinction between explicit and implicit attitudes and explicit and implicit measures of attitudes. Explicit attitudes are attitudes that can be reported and consciously controlled and implicit attitudes are attitudes that cannot be consciously reported or controlled (Rydell & McConnell, 2006). Most explicit measures of attitude are some form of direct self-report (Olson, Goffin, & Haynes, 2007). Logically, self-report can only measure explicit attitudes which a person can report. Implicit measures avoid self-report. Thus these measures will reduce false responses by eliminating self-censoring and social desirable responding. Further, because implicit measures do not require a report they can even capture implicit attitudes. Studying student satisfaction with an implicit measure may provide a better measure of student satisfaction.

Finally, most previous studies measured student satisfaction at one point in time. These studies have not considered how these attitudes may differ over the student's college experience. A focus on a specific time in the student's college career misses how satisfaction levels may change over this career. The study of student satisfaction would benefit from a study that considers attitude at various points across the college career.

This study had three goals. First, it added to the literature examining student satisfaction using a global measure of satisfaction with academic majors. Second, this study addressed the measurement limitations mentioned above by implementing a new implicit measure of attitudes to evaluate whether students have a positive or negative attitude toward their major discipline. The implicit measure of attitude was compared to

an explicit measure, the AMSS created by Nauta, to determine the correlation between the implicit and explicit attitudes. Third, this study determined whether student satisfaction varies across the college experience. It compared satisfaction with the major at three distinct points during the college career.

This study may have significant implications. Past research (e.g., Suhre, Jansen, Harskamp, 2007; Starr, Betz, & Menne, 1972; Graunke & Woosley, 2005) has shown that higher levels of student satisfaction lead to greater persistence in academics, higher grade point averages, and increased retention rates. Conversely, higher levels of student dissatisfaction lead to decreased determination, lower grade point averages, and higher dropout rates. Therefore, the methodology of this study, if successful, could be used to identify individual students who are dissatisfied with their majors by assessing their attitudes towards their majors in a way that will increase the likelihood of accurate responses. Then support and intervention could be arranged to increase the probability that they will graduate.

There are also benefits for the instructor, department, or university. Students who are dissatisfied with their majors could be attributing their dissatisfaction to “flaws” in the instructor, department, or university. Many instructors, departments, and universities use student evaluations as a basis for implementing changes in curriculum, policy, and even personnel. If this method could more accurately determine the students’ attitude toward the major then academic services could use that information to place students in a more satisfying major. Then the student ratings of the instructors, departments, and universities would not be skewed by general dissatisfaction. Instead the information would be more specifically useful.

## LITERATURE REVIEW

### Student Satisfaction with Major Discipline

College student satisfaction has been a topic of study for over half a century. Student satisfaction is especially important to faculty and administrators of colleges and universities. It may also matter to future employers of college graduates. Student satisfaction predicts academic, personal and professional achievement, all of which an employer would desire in his or her employees (Bean & Bradley, 1986; Pike, 1993).

#### *The Historical Perspective on Measuring Student Satisfaction*

Early studies of student satisfaction were modeled after job or employment satisfaction research, methods, and theories. For example, the College Student Satisfaction Questionnaire (CSSQ) developed by Betz, Klingensmith, and Menne (1969), was designed to measure college student satisfaction as an analogue to job satisfaction. It was designed based on job satisfaction research (e.g., Herzberg, Mausner, Peterson, & Capwell, 1957). The CSSQ was also modeled after the Minnesota Satisfaction Questionnaire, another measure of job satisfaction (Weiss, Dawis, & England, 1967). The CSSQ measured six dimensions of college student satisfaction and included variables unique to the college environment. The CSSQ measured satisfaction with policies and procedures, working conditions, compensation, quality of education, social life, and recognition.

Research in student satisfaction has been most shaped by Holland's theory of vocational choice (Holland, 1997). This theory combines psychological and sociological factors to create a model of person-environment fit. This model can be used to explain

and predict the student-major fit and other aspects of student satisfaction (Smart, Feldman, & Ethington, 2000).

Holland's theory describes six personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Each type fits best in one of six different environments that parallels the characteristics of that type (Holland, 1997). Holland's theory states that the closer the match between the personality type and the environment the greater the job satisfaction.

In an academic setting, Holland's model would suggest that students select majors which match their personality types. This theory gives rise to three propositions about college students and their academic majors. First, the satisfying academic major would support and reward the students' abilities and interests. Second, students are more likely to prosper in environments that match their personality types. Finally, a positive match would lead to greater satisfaction with the major discipline and persistence in education (Pike, 2006). Research has given strong support for all of these propositions (e.g., Hackett & Lent, 1992; Smart, Feldman, & Ethington, 2000; Walsh & Holland, 1992). Also, Holland's theory (1997) predicts that satisfaction with the academic major would increase over the course of the students' academic careers if they leave mismatching, unsatisfying majors for those that will be more satisfying.

Though the research on student satisfaction has grown and matured, many current studies still work by analogy to employment satisfaction. For instance, Allen (1996) concluded that one's satisfaction with his or her field of study is analogous to job satisfaction because work environments are similar to academic environments. Both offer variations of reinforcement patterns, opportunities to use various interests and skills,

and chances to implement one's self-concept. Furthermore, the similarity between employment and academic life is important because student's satisfaction with their academic discipline correlates positively with their future employment satisfaction (Astin, 1965).

Though Holland's perspective has dominated this research, other approaches have been used in studies of student satisfaction. A subset of student satisfaction studies have focused on satisfaction with components of the major. For example, are students satisfied with advising, instruction, career preparation, text choice, number of course offerings, class sizes, etc (e.g., Betz, Klingensmith, & Menne, 1969; Braskamp, Wise, & Hengstler, 1979; Corts, Lounsbury, Saudargas, & Tatum, 2000)?

Currently, student satisfaction research focuses primarily on End of Course (EOC) evaluations. Universities use many types of EOC evaluation. EOC evaluations are administered to currently enrolled students to measure students' perceptions of and satisfaction with specific features of their academic experience. For example, many EOC evaluations ask questions concerning the students' opinions towards textbooks, course content, grading criteria, professors' preparation for classes, etc.

### *The Uses of Student Satisfaction*

Almost all studies treat student satisfaction as an outcome or dependent variable in a research question. For instance, Norman and Redlo (1952) found that the Minnesota Multiphasic Personality Inventory (MMPI) can distinguish a distinctive personality profile among students in the same major. They also found that students who are strongly satisfied with their major most closely resemble the MMPI personality profile associated with that major. On the other hand, students who are less satisfied or would

choose a different major if given the choice, deviate more from this profile. Norman and Redlo also found that students are more likely to be satisfied with their college major if their personalities are similar to the personalities of their fellow students. In other words, birds of a feather are more satisfied when flocking together.

Many studies utilize student satisfaction as a measure of the quality of the program or department. For example, Corts, Lounsbury, Saudargas, and Tatum (2000) found that satisfaction with the major is related to satisfaction with advising, course offerings, class sizes, instruction, and career preparation. Thus, student ratings of quality are probably a function of the satisfaction the students have with their major.

Another example of how student satisfaction is used as a measure of the program or department is the Program Evaluation Survey (PES) developed by Smock and Hake (1977). The PES was administered to college students to measure their perceptions of and satisfaction with instruction, curriculum, advising, and operations in their major department (Wise, Hengstler, & Braskamp, 1981). The PES was developed to serve two purposes. First, it was used by administrators in making comparative judgments across departments for setting administrative priorities related to those departments. Second, it helped the faculty and department leaders identify strengths and weaknesses within departments, providing direction for improvements (Derry & Brandenburg, 1978; Braskamp, Wise, & Hengstler, 1979). Many of the EOC evaluations are based on the same premise as the PES.

A subset of studies does not see student satisfaction as an outcome. These studies use measures of satisfaction to predict other outcomes. For example, Starr, Betz, and Menne, (1972) found that the overall satisfaction level was inversely related to whether

the student remained enrolled at the university. The satisfaction scores of students who returned to school were significantly higher than those who had dropped out the following year. Adamek and Goudy (1966) reported that the students' identification with their academic major, which according to Holland's theory would translate into satisfaction, was related to persistence in the major. They found that students with high levels of identification with the academic major were much less likely to change majors during their college career. Suhre, Jansen, & Harskamp (2007) found that student accomplishment depends on degree program satisfaction. Thus, higher levels of satisfaction will not only lead to greater retention in the program and university but to also more productive academic careers for the retained students. Because student satisfaction is so often used as either an outcome measure or as a predictor of other outcomes, it seems critically important that the measure be both reliable and valid.

*Satisfaction with the Major Discipline versus General Satisfaction*

Many studies only measure general student satisfaction. However, general student satisfaction with higher education is not necessarily correlated with satisfaction with an academic major (Nauta, 2007). A student's satisfaction with higher education may be influenced by many non-academic components. However, the student's satisfaction with his or her major discipline, or major satisfaction, probably depends upon whether an individual feels the major is meeting his or her academic needs (Starr, Betz, & Menne, 1972) or fulfilling the student's educational expectations (Suhre, Jansen, & Harskamp, 2007).

In student satisfaction research, Nauta (2007) is noteworthy for her clear focus on the students' major satisfaction. Nauta noted the absence of research that provided a



specific assessment of major satisfaction. She indicated that too often previous work focused on assessing satisfaction with the components of major programs. Nauta suggested that an individual could be satisfied with components of a major but still feel dissatisfied with the major. The primary predictor of this dissatisfaction would be a poor match between the major and the student's interests and abilities (Holland, 1997; Allen, 1996), expectations (Pike, 2006), personality (Holland, 1997; Pike, 2006), values or self-concepts (Nauta, 2007).

Further, in the limited number of studies that considered an overall measure of major satisfaction (e.g., Sherrick, Davenport, & Colina, 1970; Wachowiak, 1972; Leong, Hardin, & Gaylor, 2005; Corts, Lounsbury, Saudargas, & Tatum, 2000), student satisfaction was typically measured with a single self-report item. For example, Corts, Lounsbury, Saudargas, and Tatum (2000) used a single item to assess overall satisfaction by asking participants, "Overall, how satisfied are you with your experience as a psychology major at UTK?" Students rated their satisfaction on a seven-point Likert scale with 1 indicating "Very Dissatisfied" and 7 indicating "Very Satisfied." Such single item measures have poor psychometric properties (e.g. Morrow, 1971). Thus, Nauta (2007) made a significant contribution to this area by developing a measure of major satisfaction with good psychometric properties.

Nauta (2007) developed and validated the Academic Major Satisfaction Scale (AMSS). In the first part of her study, Nauta generated 20 items that measured satisfaction with a student's declared major. These items were loosely based on other satisfaction measures such as life and job satisfaction. The participants' scores were assessed as predictors of retention in the major over a two year interval. The final

version of the AMSS included only those six items which accurately predicted retention in the major or change of majors. These six items were: 1) I often wish I hadn't gotten into this major; 2) I wish I was happier with my choice of academic major; 3) I am strongly considering changing to another major; 4) Overall, I am happy with the major I've chosen; 5) I feel good about the major I've selected; and, 6) I would like to talk with someone about changing my major.

The second part of Nauta's study confirmed the predictive validity of these six items and related the scores to other outcome measures. Again, the six item satisfaction scores were compared to the number of students who remained in or changed their majors over a two year interval. The second study also compared the six items scores to GPAs, scores on the Career Decision Self-Efficacy Scale-Short Form (CDSE-SF; Betz, Klein, & Taylor, 1996), the Career Factors Inventory (CFI; Chartrand & Robbins, 1997), and the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1988).

Nauta (2007) concluded that the six-item AMSS scores successfully distinguished between students who persisted in their major and those who changed majors within the two year period. High initial AMSS scores predicted persistence and low scores predicted a change in major. Further, AMSS scores improved among both students who changed majors and among students who had high initial scores and remained in their original major. Finally, higher AMSS scores were positively associated with better academic performance (e.g. higher GPAs) and reported career decision self-efficacy (e.g. higher CDSE-SF scores).

However, the AMSS scores were also significantly associated with two forms of socially desirable responding previously defined by Paulhus (1988). First, there was a

tendency to give honest but unconsciously favorable self-descriptions and second, there was a tendency to consciously give inflated self-descriptions as a way of managing one's image for an audience. This suggests that students, who are motivated to present favorably, both to themselves and to an audience, perceive that it is desirable to express satisfaction with their majors.

The AMSS was developed to measure overall major satisfaction. The scores on the AMSS seemed to match two key theoretical predictions. First, the satisfaction scores match Holland's prediction that satisfaction will increase over the course of the students' academic career as they persist in satisfying majors or leave unsatisfying majors for more satisfying disciplines (Holland, 1997). Second, the results match the prediction of Starr, Betz, and Menne (1972) that higher satisfaction predicts academic persistence.

Thus, the AMSS may be an adequate measure of major satisfaction. It may be used to confirm that matching personal attributes to attributes of the major, as Holland's theory suggests, will lead to higher major satisfaction. In practical terms, the AMSS may become a screening tool to identify students who are dissatisfied with their major and who may benefit from career counseling. The AMSS may then be used to test the effectiveness of career interventions with college students. Measures of major satisfaction could lead to identifying suitable majors for the individual. Lastly, since dissatisfaction with the major has been associated with decreased academic performance, the AMSS may be used for early identification of students who are at risk for academic problems and academic dismissal (Nauta, 2007). Early intervention with students dissatisfied with their major could aid in decreasing academic problems and distress.

However, there are limitations in Nauta's study that may limit the use of the AMSS. First, her sample was largely female Caucasians. This leaves open a question about the AMSS's psychometric properties among more diverse samples. Second, the AMSS relied on explicit, self-report responses. Nauta even reported that she found high levels of responding for social desirability. Such responding may cloak a person's level of dissatisfaction with a major. While Nauta's AMSS is a good step, perhaps measurements other than self-reports could clarify the extent to which socially desirable responding confounds measuring students' major satisfaction.

Major satisfaction can be seen as an attitude toward the major discipline. Thus, alternative measures of major satisfaction may be found in the study of these attitudes.

## Defining and Measuring Attitudes

### *Explicit and Implicit Attitudes*

The study of attitudes has had a long and rich history in social psychology (Eagly & Chaiken, 1993). Attitudes are directed toward specific “objects.” An object can be a thing, an action or even a value or belief. Attitudes include cognitions or thoughts about the object, e.g. “As a psychology major, I think psychology is an important field.” The cognitive component of an attitude is often evaluative. Attitudes include affect or feeling about the object, e.g. “As a psychology major, I feel very happy when I am talking about my major.” Finally, attitudes include behaviors directed to or related to the object, e.g. “As a psychology major, I always enroll in at least two Psychology courses each semester.” We most often study attitudes when they are displayed as statements or feelings of favor or disfavor about a specific object or activity (Thompson, Zanna, & Griffin, 1995; Eagly & Chaiken, 1993). Attitudes tell people whether objects or activities in their environments are good or bad.

Early studies assumed that objects or activities would relate to one positive or negative attitude. Yet, there are times when people hold more than one evaluation of the same object or activity. Wilson, Lindsey, and Schooler (2000) argue that people sometimes possess “dual-attitudes,” or two different simultaneous evaluations of the same attitude object. Often one of these attitudes is an explicit attitude and the second is an implicit attitude.

Explicit attitudes are attitudes that people can report and consciously control. In other words, an individual can state her opinion about a country music song. This is reporting her attitude. She may use reasoning to determine and justify her opinion

towards it. For example, she may like a country music song because it reminds her of her grandfather. Explicit attitudes change quickly in response to new information and reflect deliberate processing goals. That is, if the woman is an animal rights activist and she learns that her favorite song is performed by a country music singer who wears fur coats, she would no longer hold such a positive attitude towards the country song. She consciously determines and controls the attitude she has towards the country music song depending on the information she associates with it. (Rydell & McConnell, 2006)

Implicit attitudes, on the other hand, are attitudes which someone may not be able to report or control (Rydell & McConnell, 2006). More specifically, implicit attitudes have unknown origins, are activated automatically, and influence responses, particularly automatic reactions. Because these reactions are automatic, they are not viewed as an expression of a person's attitude and the person cannot attempt to control them (Greenwald & Banaji, 1995). Implicit attitudes change much more slowly than explicit attitudes (Rydell & McConnell, 2006).

Explicit and implicit attitudes are also linked to behaviors differently. Explicit attitudes predict different behaviors than do implicit attitudes. According to Rydell and McConnell (2006), explicit attitudes predict deliberate target-relevant judgments and implicit attitudes predict spontaneous behaviors that people do not monitor consciously (Wilson, Lindsey, & Schooler, 2000). For example, explicit attitudes toward African Americans predicted ratings of guilt for an African American defendant (Dovidio, Kawakami, Johnson, & Johnson, 1997), and attractiveness rating of photos of African Americans versus Caucasians, and feelings about the Rodney King court verdict (Fazio, Jackson, Dunton, & Williams, 1995). On the other hand, implicit attitudes predicted

behaviors such as how friendly the participants were with an African American experimenter (Fazio et al., 1995) or participant (unpublished data from Dovidio, 1995, cited in Wilson, Lindsey & Schooler, 2000), nonverbal behavior, such as visual contact and rate of blinking, toward African American versus Caucasian interviewers (Dovidio et al., 1997) and how often they handed a pen to an African American confederate as opposed to placing it on the table for the confederate to pick up (unpublished data from Wilson, Daminani, & Shelton, 1998 cited in Wilson, Lindsey & Schooler, 2000).

Wilson, Lindsey, and Schooler (2000) found that an individual can hold both an implicit and an explicit attitude for the same object or activity. If a person holds two attitudes, which one will influence the individual's response to an object or activity? The attitude that people experience at any point in time depends on whether they successfully retrieve the explicit attitude and whether the explicit attitude overrides the implicit one. In other words, a person's reaction to seafood depends on whether the individual can think about all the delightful seafood meals in her past (the cognitive capacity to retrieve the explicit attitude) or if she reacts with automatic disgust because of one time she got food poisoning after eating seafood (an automatic response due to an implicit attitude). In this case, the implicit attitude preempts a search for an explicit attitude and she never has the chance to think of all the former wonderful experiences.

The early history of attitude research was largely focused on explicit attitudes. There has been a recent shift from an almost exclusive interest in explicit attitudes to more interest in implicit attitudes (Rydell & McConnell, 2006). This shift both called for and was made possible by the development of new ways to measure attitudes.

### *Explicit and Implicit Measures of Attitudes*

Most attitude research has used explicit measures of attitude and the most common form of attitude assessment is direct self-report (Olson, Goffin, & Haynes, 2007). Logically, if a measure requires a self-report, then responses on the measure would reflect only those explicit attitudes which a person can report. Thus, self-reports of attitudes are probably limited to explicit attitudes (Albarracín, Johnson, & Zanna, 2005; Olson & Maia, 2003). Unfortunately, because individuals may choose whether to use an explicit attitude the self-report response will not necessarily reveal the person's attitude. This is seen in responding shaped to meet social desirability. For example, if someone is Pro-Life (this is an explicit attitude which can be reported) he or she may not express their opinion to a dear friend who is pregnant and is considering abortion as an option.

Thus, attitudes may be measured explicitly only if they can be reported and the participant chooses to make such a report. Explicit measurements of attitudes may fail if a person is unaware of the attitude. Explicit measures may also fail due to the actual, implied, or imagined social desirability of one response on the measure. When individuals perceive one response as more desirable than their responses may shift. At this point the individuals' ability and willingness to respond accurately and honestly is compromised.

### *Implicit Measures of Attitudes*

Implicit measures of attitudes are the newest methods of evaluating attitudes. Measuring attitudes implicitly avoids the problems of measurement detailed above. According to Fazio and Olson (2003), an implicit measure of attitudes "seeks to provide



an estimate of the construct of interest without having to directly ask the participant for a verbal report” (p. 300). With an implicit measure the person does not have to generate a report. Thus, implicit measures can be used to measure both explicit and implicit attitudes. Further, since the participant does not actively generate a response implicit measures circumvent self-presentation motives such as social desirability (Dunton & Fazio, 1997).

The most well-known and commonly used implicit measures of attitudes are the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998) and the Affect Misattribution Procedure (AMP) (Payne, Cheng, Govorun, & Stewart, 2005).

#### *The Implicit Association Test*

The Implicit Association Test (IAT) (Greenwald, et al. 1998) was designed to tap underlying implicit attitudes (Karpinski & Hilton, 2001). It measures attitudes by examining the automatic associations between attitude objects and evaluative labels. Specifically, the IAT measures how closely associated any given attitude object (e.g., a flower or and insect) is with an evaluative label (e.g., pretty or scary). Objects and attributes would be related by an underlying implicit attitude. If a person implicitly believes that insects are dangerous then insects and negative words would be related for that individual. To measure the degree of association participants are asked to classify words using four categories mapped onto only two response keys. That is, press left if the word is a flower or good but press right if the word is an insect or bad. The arrangement can also reverse the objects and attributes. That is, press left if the word is a flower or bad, press right for an insect or good. The IAT results assume that the classification task will be easier when the object and attribute represented on the same

key are connected by an implicit attitude. I implicitly believe insects are dangerous therefore I can more quickly identify insects with a response that is also associated with bad things. Thus, attitude ratings are based on reaction time: people are quicker to respond when preferred items are paired with positive words than when non-preferred items are paired with positive words and vice versa (Karpinski & Hilton, 2001).

The IAT is conducted using a computer and pressing left versus right keys. The first two stages are learning stages where participants become familiar with the categorization process. In the first stage participants categorize words that are exemplars of the object class. Using the same example from above, participants are asked to categorize words, such as daisy or ant, as “flower words” or “insect words” by pressing the left key for flower words and the right key for insect words. In the second stage, participants categorize words that are exemplars of the attribute. For example, “cheer” is a pleasant word and “ugly” is an unpleasant word. Participants press either the left key for “pleasant” or right key for “unpleasant.” The third stage combines the previously learned categorizations. In this stage, participants are instructed to push the left key for either a flower word or a pleasant word and to push right key for either an insect word or an unpleasant word. This is the “congruent combined” phase. In the fourth stage the response keys are reversed to make sure that there is no side bias. In the fifth stage, participants are asked to push the same key for contradictory word associations. For example, push the left key for either insect words or pleasant words and the right key for either flower words or unpleasant words. This is the “incongruent combined” phase.

The IAT score is the difference in the response times for congruent combined and incongruent combined phases. Individuals who respond more quickly when a pleasant

word and a flower word are paired together are considered to have a more positive attitude toward flowers than insects. Conversely, individuals who respond more quickly when a pleasant word is paired with an insect word are considered to have a more positive attitude toward insects than flowers (Greenwald, et al. 1998).

Sometimes the IAT scores show the same pattern as explicit measures (Greenwald et al, 1998). For example, traditional measures of attitudes have found that, on average, people have more positive attitudes toward flowers and musical instruments than insects and weapons, respectively. Greenwald et al. (1998) found the same results with the IAT: flowers and musical instruments have a closer association with positive words than insects and weapons. Other times, however, IAT scores seem to be independent of explicitly measures of attitudes (Karpinski & Hilton, 2001). In all three experiments in their study, Karpinski and Hilton failed to find any correlations between the IAT and explicit attitude measures toward flowers versus insects, apples versus candy, and the young versus the elderly, even when social desirability pressure was minimized.

However, there are several controversies surrounding the IAT. First, the reliability estimates based on internal consistency for the IAT range from quite high (Hoffman, Gawronski, Gschwendener, Le & Schmitt, 2005) to quite low (Bosson, Swann & Pennebaker, 2000; Cunningham, Preacher, & Banaji, 2001). Test-retest reliability of the IAT falls below satisfactory level (Nosek, Greenwald, & Banaji, 2006). Many studies have shown that the IAT is “fakable” (e.g., Fiedler & Bluemke, 2005) if participants are informed beforehand about how to fake (Kim, 2003) or if participants are asked to pretend to have an attitude toward fictitious target objects (De Houwer, Beckers, &

Moors, 2007). Correlations between the IAT and other implicit measures are typically weak (Bosson et al., 2000) and the inter-item consistency of these implicit measures are lower than the inter-item consistency of most standard measures of attitudes and beliefs (Cunningham, Preacher, and Banaji, 2001) raising questions about the stability and convergent validity with other implicit measures. Thus, while the IAT is interesting it does seem procedurally complex and a bit unstable.

#### *The Affect Misattribution Procedure*

The Affect Misattribution Procedure (AMP) (Payne, et al., 2005) is another implicit measure of attitude. It measures the influence of positive and negative attitudes on behavior that occur independent of participants' intentions. In this procedure, affect is assumed to be a pleasant or an unpleasant reaction (Frijda, 1999; Russell, 2003). This affective response is the product of attitude driven processes that may be either conscious or unconscious (Payne, et al 2005). Misattribution occurs when one mistakenly assigns this affect response to one source when it actually arose from another. For example, someone may misattribute the pleasure of a sunny day (actual source of affect) as enduring life satisfaction (mistaken source of affect).

The procedure of the AMP, as designed by Payne et al. (2005) is fairly simple. Participants are shown a brief priming stimulus followed by a neutral target. The priming stimulus is an iconic representation of an object or activity about which the individual presumably holds an attitude. The neutral target is ambiguous image about which they should not hold a distinct attitude. However, they are asked to rate the neutral target as more pleasant than average or less pleasant than average. That is, they are asked to respond as if they hold an attitude about the neutral target. For example, a priming

picture of a flower or an insect would precede a Chinese character neutral target. The neutral target is to be rated.

Even though Payne et al. (2005) found that there was no difference in the results of the AMP procedure between participants instructed with versus without warnings about ignoring the prime stimuli, the true nature of the experiment was concealed by using a cover story stating that the study examined “how people make simple but quick judgments” and participants are explicitly warned not to let the priming stimulus affect the way they rate the neutral target. However, the iconic image gives rise to positive or negative affect and this affect is misattributed to the ambiguous image during the rating process. The source of the affect is the participant’s implicit attitude toward the priming image. Objects toward which the participant holds positive attitudes would generate positive affect. This would be misattributed to the neutral target and that target would be rated as more pleasant than average. Continuing with the example above, a neutral target following an image of a flower will probably be rated more pleasing than average and a neutral target following a picture of an insect will probably be rated less pleasing than average. These ratings would indicate that the individual has a more positive attitude towards flowers than insects.

The AMP is a statistically sound measurement of attitude. It has demonstrated validity in several tests (e.g., predicting intended voting behavior and explicit attitudes toward political candidates, Payne et al., 2005; Moody, Okon & Gordon, 2009, or predicting drinking behavior, Payne, Govorun, & Arbuckle, 2008). It also has high reliability, approximately  $\alpha = .88$  (Payne, et al. 2005).

This validity persists in a number of variations of the procedure. Gordon and Moody (2008) demonstrated the AMP can be conducted in a group setting with repeated measures and yield the same results as single subject single trial procedure (Payne et al., 2005). In a separate study, Gordon (2009) has also examined the use of various neutral targets, such as randomized gray square patterns, inkblots, and Chinese pictographs, and determined that differences between the variations were not significant. In a final study, Gordon and Stokes (2009) tested the effects of varying the priming duration finding that experimenters can use various priming durations without skewing scores.

The high validity and reliability in combination with the flexibility and ease of administration makes the AMP a preferred procedure over the IAT as an implicit measure of attitudes. It is the measure that was used in this study.

## PURPOSE OF STUDY

Studies of students' major satisfaction are limited in their value. Most studies have studied student satisfaction with one or a few components of their majors without directly assessing their overall satisfaction with their majors. Those that have focused on overall major satisfaction have only used a single item in measuring the level of satisfaction. The study conducted by Nauta (2007), addressed these issues concerning measuring major satisfaction and developed a six item scale, the AMSS. Although Nauta has addressed major satisfaction directly, she acknowledged that she only had self-reports and that these responses might have been confounded by social desirability. One purpose of this study is to compare the AMSS scores, an explicit measure of attitude, to AMP scores, an implicit measure of attitude.

Most previous studies of major satisfaction have only measured satisfaction at a single point in time during college. This study compared satisfaction levels at three different points in the college experience in a cross-sectional design. Therefore, this study attempted to fill in a gap of previous work by focusing on how satisfaction levels differ over the duration of the students' college experience.

The AMP is a promising emergent method for measuring attitudes. The third purpose of this study is to apply the AMP to the measurement of satisfaction as well as to add to the literature of the use of the AMP and the comparison of implicit and explicit attitudes.

*Hypotheses*

1. Attitudes towards the individuals' major discipline measured both explicitly and implicitly will become more positive as they progress through college.
2. The implicit measure of attitudes will be more positive towards the individuals' major discipline than the non-major disciplines.
3. The implicit measure of attitude toward the major discipline will be correlated with explicit measure of attitude of the same at each point in the college experience.



## METHOD

### *Participants*

This sample was comprised of 130 undergraduate students enrolled at a southeastern public university. Of these 130 students, 13 believed they knew the meaning of the Chinese characters used as neutral targets, 15 were not psychology majors, and 3 failed to participate in the study. These 31 students were excluded. Therefore, only 99 of the 130 were used for data analysis. They participated as volunteers, for class credit or for extra credit. The participants were placed in one of three groups defined by the number of credit hours they had completed at the university: Early (less than 44 hours), Mid (between 45 and 89 hours), and Late (greater or equal to 90 hours). They were all majoring in the same program at the university: Psychology. The Early group (n=28) was mostly recruited from introductory classes as part of their requirement for research participation. The Mid group (n=33) was recruited from upper level courses of their majors that typically enroll sophomore and juniors. The Late group (n=38) was recruited from upper level courses of their major that typically enroll seniors.

### *Materials*

The materials used for this study included an informed consent form (Appendix A) and a standard Scantron form. The Scantrons were used to collect all responses for the AMP, the AMSS and the statement “I am satisfied with my academic major” (Appendix B), and the demographic information (Appendix C).

This study used a variation of the AMP (Payne, Cheng, Govorun, & Stewart, 2005) developed by Gordon and Moody (2008). The participants watched a short video

clip in which image triads were presented. The triads consisted of a prime, a neutral target and a filler stimulus. The primes were 44 images previously rated on content and valence, 12 each representing Psychology (Appendix D), Music (Appendix E) and Construction Management (Appendix F). The content for each image was previously rated by a different group using a Likert-scale ranging from 1 (Obviously “the major”) to 5 (Obviously not “the major”). The content ratings for the 12 Psychology images ranged from 1.55 to 3.56 with an average of 2.21. The content ratings for the 12 Music images ranged from 1.50 to 2.78 with an average of 2.16. The content ratings for the 12 Construction Management images ranged from 1.77 to 2.55 with an average of 2.20. The same group rated the valence for each image using a Likert-scale ranging from 1 (Very Positive) to 5 (Very Negative). The Psychology images had valence ratings from 2.10 to 3.81 with an average of 2.60. The Music images had valence ratings from 1.97 to 3.44 with an average of 2.76. The Construction Management images had valence ratings from 1.77 to 3.66 with an average of 2.72. See Appendix G for a more complete description of the rating method. There were also 4 known pleasant and 4 known unpleasant images drawn from the International Affective Picture System (IAPS; Lang, Bradley & Cuthbert, 1995). The neutral targets were various Chinese characters, each consisting of 6 or more lines per character. Each of the primes was presented in random order once within the video clip. Between prime-target pairs a numbered homogenous blue field was a filler stimulus.

The explicit measure of attitudes was the AMSS, which was previously used to study major satisfaction (Nauta, 2007) and the statement “I am satisfied with my academic major.”

*Procedure*

The participants were tested in a group setting in a classroom with one experimenter present. The participants were asked to give informed consent before beginning the test. The participants read and heard the instructions listed in Appendix H.

The participants then completed ten practice trials. After the practice trials and questions, the participants began the AMP test. The test included 44 stimulus triads with a 250 ms prime, a 1 s target and a 5 s filler or mask stimulus. While the mask is on the screen the participants marked on a Scantron response sheet whether the target stimulus was “much more pleasing than average,” “more pleasing than average,” “less pleasing than average” or “much less pleasing than average.” The mask stimulus included a numeral indicating to the participants in which space they are to mark for that trial.

After completing the AMP, the AMSS and the additional statement were projected and read aloud and the participants marked their answers on the Scantron form with a 5-point Likert scale ranging from strongly agree to strongly disagree. After completing the AMSS and the additional statement, the demographic questions were projected and read aloud and the participants marked their answers on the Scantron form. They were debriefed and thanked for their participation.

## RESULTS

The AMSS scores range from 1-5 and larger scores are more positive for the major. AMP scores range from 1 to 4 and larger scores are more positive toward the major represented by the prime. The means, standard deviations and sample sizes for both measures for all primes at each college level are listed in Table 1.

Table 1

*Average score at each college level*

	Early (0-44 c.h.*)	Mid (45-89 c.h.)	Late (≥ 90 c.h.)
AMP			
Music			
mean	2.66	2.79	2.6
s.d. **	0.26	0.42	0.43
Construction Management			
mean	2.7	2.8	2.68
s.d.	0.33	0.46	0.46
Psychology			
mean	2.63	2.82	2.68
s.d.	0.31	0.40	0.42
AMSS			
mean	4.26	4.20	4.43
s.d.	0.76	0.69	0.74
n =	28	33	38

\* c.h. = credit hours

\*\* s.d. = standard deviation

Hypothesis 1 was that attitudes towards the individuals' major discipline measured both explicitly and implicitly will become more positive as they progress through college was tested with an 1-way ANOVA for the explicit measure, AMSS scores, and a 3 x 3 ANOVA for the implicit measure, AMP scores. The ANOVA for AMSS found that scores did not change significantly across college level,  $F(2, 98)=1.016$ ,  $p=0.366$ . The ANOVA for AMP scores found that there was no interaction between the prime and the college level,  $F(4,192)=0.857$ ,  $p=0.491$ . Further, the main effect of college level did not produce significant changes in AMP scores. Hypothesis 1 was not supported.

Hypothesis 2 that the implicit measure of attitude will be more positive towards the individuals' major discipline than the non-major disciplines was tested as the main effect of prime in the 3 x 3 ANOVA for the AMP scores. This test found there was no significant difference between the attitudes towards the individual's major and non-major disciplines,  $F(2, 192)=1.167$ ,  $p=0.313$  (see Figure 1). Hypothesis 2 was not supported.

Hypothesis 3 that the implicit measure of attitude toward the major discipline will be correlated with explicit measure of attitude of the same at each point in the college experience was tested with a Spearman Rho correlation. There was no correlation between the entire set of scores on the two measures,  $P = -0.016$ ,  $n = 99$ ,  $p = 0.879$ . The correlations between the two measures at each level are listed in Table 2. Hypothesis 3 was not supported.

Table 2

*Spearman P for Psychology AMP and AMSS*

	Early (0-44 c.h.)	Mid (45-89 c.h.)	Late (≥ 90 c.h.)	Total
Spearman P =	0.384	-0.076	-0.047	-0.016
p =	0.044	0.674	0.781	0.879
n=	28	33	38	99

*Exploratory analyses*

One of the more interesting contrasts in the data is the pattern of average AMSS scores versus average AMP scores for Psychology majors at each level (see Figure 2). While neither set of average scores changed significantly,  $F(2,98)=1.016$ ,  $p=0.366$  for the AMSS scores and  $F(2,98)=2.086$ ,  $p=0.130$  for the AMP scores, the averages changed in opposite directions at each level.

To consider the agreement between the AMSS and the statement “I am satisfied with my academic major” a Pearson’s correlation coefficient was calculated at each level and overall. These correlations are listed in Table 3 below.

Table 3

*Pearson’s r for AMSS and statement “I am satisfied with my academic major”*

	Early (0-44 c.h.)	Mid (45-89 c.h.)	Late (≥ 90 c.h.)	Total
Pearson’s r =	0.938	0.371	0.912	0.724
p =	0.000	0.033	0.000	0.000
n=	28	33	38	99

To consider the reliability of both measures at each level Cronbach's alpha was calculated for the AMP within each major discipline and the AMSS. Table 4 lists the Cronbach's alpha for each dimension.

Table 4

*Cronbach's alpha\* for each dimension*

	Early (0-44 c.h.)	Mid (45-89 c.h.)	Late (≥ 90 c.h.)	Total
AMP				
Music	0.356	0.733	0.704	0.681
Construction Management	0.532	0.769	0.759	0.722
Psychology	0.455	0.665	0.691	0.656
AMSS	0.91	0.828	0.894	0.864
n=	28	33	38	99

\*Cronbach's scores of 0.7 or higher are considered acceptable reliability

## DISCUSSION

The attitudes towards the individuals' majors did not increase gradually as expected. As measured with the explicit measure of attitude, the AMSS, the positive evaluations decreased between the Early and Mid sections and increased between the Mid and Late sections. Attitudes measured implicitly with the AMP showed opposite trend: positive evaluations increased between Early and Mid sections but decreased between Mid and Late sections. While none of these changes are significant, the pattern is noteworthy. The explicit and implicit measures of attitudes convey different and mirroring representations of attitudes towards the individuals' major discipline (See Figure 2). This information supports the theory that implicit measures of attitude capture a different attitude than explicit measures.

Attitudes towards an individual's own major discipline did not differ significantly from the other major disciplines at any level in the college experience when measured with the AMP. This is possibly a problem with the AMP. Even though the test has been shown to be valid and in the current use the primes for each major were carefully selected to be very similar in content and valence ratings, the primes, as shown in Appendix D, may not have been ideal for representing psychology.

While only psychology majors participated in the study, the overall reliability of the scores was lowest for psychology primes. However, the scores after psychology primes did increase with college level. This could indicate that psychology is a difficult major to capture in an iconic image. This problem could have been made worse by the image rating procedure. The images were rated by a group of students from various



major programs. The judgment and ratings of a mixed group could be different from that of a group studying psychology.

However, even with this possible confound in the ratings, psychology majors become more consistent in their responses to the psychology images over college level. The reliability score for the AMP in the Late level students is almost within the acceptable range. This could indicate that as psychology majors progress through college, they become more familiar with general iconic representations of psychology.

To return to the central idea in this study, implicit and explicit measures of attitude towards the major discipline were not generally correlated (for the overall correlation  $P = -0.016$ ,  $n = 99$ ,  $p = 0.879$ ). The two measures were correlated at only one of the three levels of college experience. The AMP for psychology primes and the AMSS were significantly correlated only at the Early college level ( $P = 0.384$ ,  $n = 28$ ,  $p = 0.044$ ). This could indicate that the explicit and implicit attitudes towards an individual's college major is congruent in the beginning of the college experience but diverge over time. On the other hand, explicit scores early in a student's college career may reflect idealized expectation rather than actual attitude.

In the exploratory analysis, the internal reliability of the AMSS was very good. Further, at all college levels the overall AMSS scores and the additional statement are positively correlated at significant levels. The AMSS, as an explicit measure of satisfaction of college major, is correlated with the statement "I am satisfied with my academic major."

In a second part of the exploratory analysis, Crohnbach's alpha was determined for both the AMSS and the AMP at all college levels for primes related to each major.

The AMSS had high internal reliability at all college levels. For the AMP scores, scores of Mid and Late participants were more reliable than the Early group in each major discipline. This could indicate that as students progress through college, the majors become more distinguishable. Psychology had the lowest overall Cronbach's alpha of the majors. This may indicate, as noted above, that the iconic representations of the psychology images were not satisfactorily consistent.

This point suggests that a limitation of this study was finding strong iconic representations of Psychology. Psychology is a diverse area with many fields, such as cognitive psychology, biological psychology, and clinical psychology. Each of these fields would have distinguishable and unique iconic representations. The focus of the individual could also determine which iconic representation of the psychology images would be most salient. Iconic representations of aspects of psychology unrelated to the individual's interests or unknown by the individual may not arouse a positive affective response and could arouse a negative affective response. Therefore, psychology's breadth, compared to the other majors, may challenge the AMP procedure.

Another limitation in representing psychology as a major is the specificity of the images. A few of the pictures that have been rated to represent psychology could represent a number of other things. For instance, a brain could represent medicine rather than neuropsychology or a child could represent education rather than developmental psychology. Similarly, a wide variety of images may be argued to have psychological components. A picture of an ape could be argued to represent evolutionary psychology and a picture representing construction management could be argued to represent industrial-organizational psychology. Therefore, finding appropriate iconic

representations of psychology, or any social science for that matter, may be difficult, perhaps impossible.

A procedural change that could be implemented in future studies using the AMP to measure satisfaction with majors would be to incorporate words as primes. Words as primes could capture the target of attitude more specifically than an iconic representation. For instance, displaying the word “psychology” would represent psychology more completely than any image and using the word “Zimbardo” may be more recognizable than an image of the person. Incorporating words may improve testing with broad or more subjective major disciplines.

Another aspect that could be changed within this study is the particular set of majors involved in the study. Majors such as music and construction management may prove to be more concrete. Thus, their iconic representation would be stronger than that of psychology. Individuals within these majors could possibly distinguish between the representations of their own major from those of others. If the procedure used only strong iconic representations of majors which are more concrete, then the debate about what the image represents could be greatly reduced.

Even though this study did not find any significant results, it was novel in three different aspects. First, this study is one of two known studies to directly address student satisfaction with their academic major versus broader and more general components of their college experience. Further research is sure to stem from this topic of interest.

Secondly, though the data did not vary systematically this study extended evaluation of student satisfaction across students’ entire college career. Thus, this study is one of very few, if any, to span the entire collegiate experience. In this study it was

necessary to use a cross sectional design, this strength could be enhanced with an extended longitudinal procedure.

Finally, it implemented the AMP into the area of measuring satisfaction. The specifics can be improved, as with better prime selection, but the measure is one that has promise and deserves further use. Further, applying the AMP in this new area adds to the AMP literature.

### *Conclusion*

The AMSS has been developed and offered as the best measurement of students' satisfaction with their college major. However, this explicit measure of attitude has its limitations, namely socially desirable responding. To bypass this problem and to determine if students hold dual attitudes towards their majors, an implicit measure of attitude, the AMP, was used to try to capture major satisfaction. Unfortunately, the AMP may have its own limitations, and this study was unable to support the utility of the AMP as a measure of satisfaction with a major. Future research with different majors and stronger iconic representations of these majors is warranted before dismissing the AMP as a measurement of students' satisfaction with their college majors.

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## Appendix A

### Major Rating Consent Form

**What is the purpose of this research?**

To determine the attitudes human beings have about things they experience in their world. This procedure will ask you to rate various images on the dimension of pleasantness and ask you your opinion related to the topic.

**What will be expected of me?**

You will be asked to watch short video clips and to rate the images you see in the video on a scale of pleasantness. You will also be asked to complete a brief opinion survey.

**How long will the research take?**

The entire testing process should take about 15 minutes.

**Will my answers be anonymous?**

Yes, your answers are anonymous. Your name will not be used at all in this research. You will be asked not to put your name on the data forms and the researcher will in no way connect you and the answers you provide.

**Can I withdraw from the study if I decide to?**

You may choose to withdraw from the procedure at anytime. You may also decline to respond if you do not wish to answer.

**Is there any harm that I might experience from taking part in the study?**

There is no foreseeable harm to the individuals participating in this study.

**How will I benefit from taking part of the research?**

Your contribution to this study will add new information to the growing research of higher education research. It may provide a new form of data collection to be used in future studies. If you are interested you may view the results at <http://paws.wcu.edu/wgordon/moodythesis.htm>. The results should be posted by the end of the semester.

**Who should I contact if I have questions or concerns about the research?**

If you have any questions about the research, contact Shauna Moody ([smmoody3@catamount.wcu.edu](mailto:smmoody3@catamount.wcu.edu)) or Dr. Winford Gordon, faculty advisor of the program ([wgordon@email.wcu.edu](mailto:wgordon@email.wcu.edu) or 828-227-3366). If you have any concerns about how you were treated during the experiment, you may contact the office of the IRB, a committee that oversees the ethical dimensions of the research process. The IRB office can be contacted at 227-3177. This research project has been approved by the IRB.

**You must be at least 18 years of age to participate in this study.**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_

## Appendix B

### Explicit Measure of Major Satisfaction

#### AMSS items

1. I often wish I hadn't gotten into this major.
2. I wish I was happier with my choice of an academic major.
3. I am strongly considering changing to another major.
4. Overall, I am happy with the major I've chosen.
5. I feel good about the major I've selected.
6. I would like to talk to someone about changing my major.

#### Additional item

7. I am satisfied with my academic major.

Participants rate their agreement with the items using a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) and respond on the Scantron form. Items 1, 2, 3, and 6 are reverse scored.

## Appendix C

## Demographics

Information gathered with space already provided for on the Scantron form

1. Gender
2. Birth date
3. Year in school

Information gathered by marking specified answers on the Scantron form

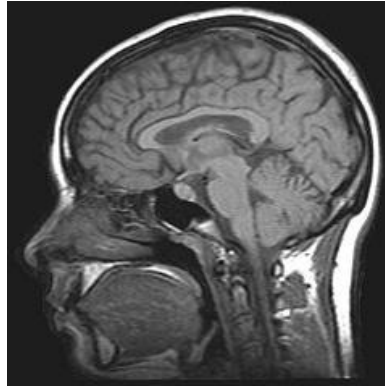
4. Approximately how many credit hours have you earned in college?
  - a. 0-30
  - b. 31-44
  - c. 45-75
  - d. 76-89
  - e. > 90
5. What is your major?
  - a. Psychology
  - b. Other
  - c. Undeclared
6. How many semesters (approximately) have you been in you declared major?
  - a. 0 semesters (undeclared)
  - b. 1-2 semesters
  - c. 3-4 semesters
  - d. 5-6 semesters
  - e. > 7 semesters
7. Have you changed majors?
  - a. Undeclared
  - b. Yes
  - c. No
8. If you have changed majors, how many times? If you have not changed majors or are undeclared, leave this question blank.
  - a. 1 time
  - b. 2 times
  - c. 3 times
  - d. 4 times
  - e. 5 or more times
9. If you have changed majors, approximately how long ago (in semesters) did you last change? If you have not changed majors or are undeclared, leave this question blank.
  - a. 1 semester ago
  - b. 2 semesters ago
  - c. 3 semesters ago
  - d. 4 semesters ago
  - e. 5 or more semesters ago

10. How certain are you in your commitment to your major?
- a. Very uncertain
  - b. Somewhat uncertain
  - c. Somewhat certain
  - d. Very certain
  - e. Have not declared a major
11. Do you believe you knew the meaning to any of these Chinese characters?
- a. Yes
  - b. No

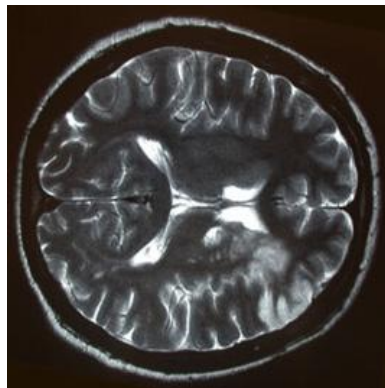


## Appendix D

Psychology Primes  
with Content (1=Obviously the Psychology and 5=Obviously not Psychology)  
and Valence Ratings (1=Very Positive and 5=Very Negative)



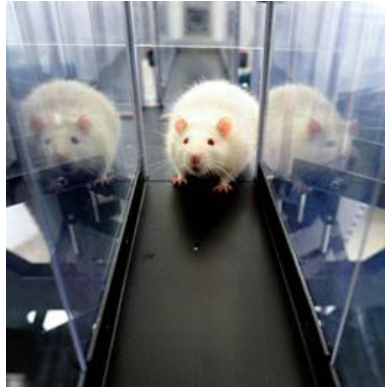
P1: Content=3.56, Valence=3.33



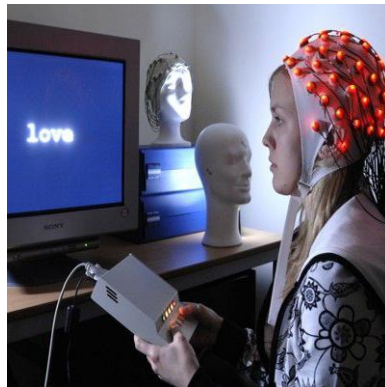
P2: Content=2.02, Valence=2.24



P3: Content=2.52, Valence=2.78



P4: Content=1.79, Valence=2.73



P5: Content=1.91, Valence=2.68



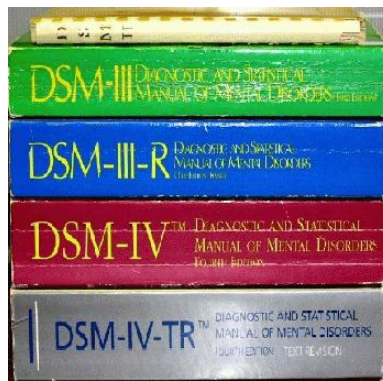
P6: Content=2.19, Valence=2.36



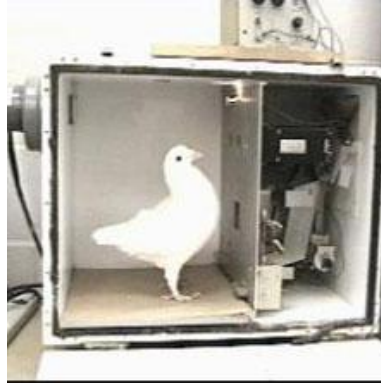
P7: Content=2.30, Valence=2.10



P8: Content=2.72, Valence=2.32



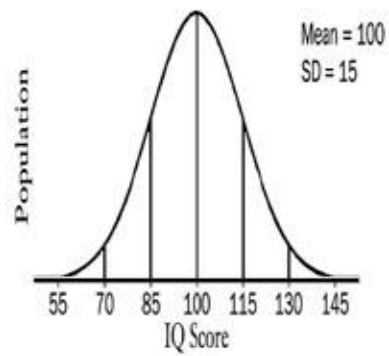
P9: Content=2.14, Valence=2.11



P10: Content=2.16, Valence=3.81



P11: Content=1.55, Valence=2.54



P12: Content=1.61, Valence=2.19

## Appendix E

### Music

with Content (1=Obviously the Music and 5=Obviously not Music)  
and Valence Ratings (1=Very Positive and 5=Very Negative)



M1: Content=2.78, Valence=2.08



M2: Content=2.27, Valence=2.52



M3: Content=2.10, Valence=3.29



M4: Content=1.52, Valence=2.76



M5: Content=1.94, Valence=2.63



M6: Content=1.66, Valence=2.69



M7: Content=1.50, Valence=2.81



M8: Content=2.56, Valence=3.00



M9: Content=1.58, Valence=3.44





M10: Content=2.72, Valence=1.97



M11: Content=2.63, Valence=3.05



M12: Content=2.68, Valence=2.94

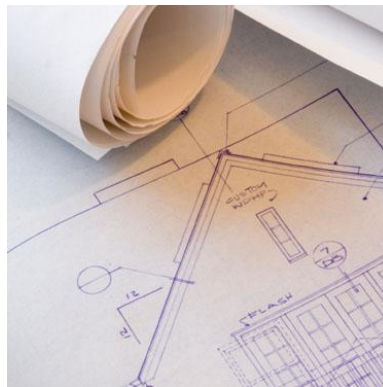


## Appendix F

Construction Management  
with Content (1=Obviously the Construction Management and 5=Obviously not  
Construction Management)  
and Valence Ratings (1=Very Positive and 5=Very Negative)



CM1: Content=2.22, Valence=2.95



CM2: Content=1.86, Valence=2.72



CM3: Content=2.27, Valence=2.48



CM4: Content=2.32, Valence=1.77



CM5: Content=2.22, Valence=3.17



CM6: Content=1.77, Valence=1.84



CM7: Content=2.20, Valence=3.03



CM8: Content=1.95, Valence=2.32



CM9: Content=2.41, Valence=3.66



CM10: Content=2.55, Valence=2.92



CM11: Content=2.50, Valence=2.42



CM12: Content=2.11, Valence=3.35

## Appendix G

### Picture Rating Method for Primes

#### *Participants*

This sample was comprised of 66 undergraduate students enrolled at a southeastern public university. These participants were recruited from a required undergraduate liberal arts class for extra credit.

#### *Materials*

The materials used in the collection of this data included a consent form and a Scantron form. This study used a Powerpoint presentation consisting of 20 images from each of the following Majors: Chemistry, Nursing, Music, Construction Management, and Psychology. Each image was presented twice to be rated on content and valence.

#### *Procedure*

The participants were tested in a group setting in a classroom with one experimenter present. The participants gave informed consent before beginning the test. The participants were informed that this was a picture rating procedure and were given the following instructions:

“The following slides will use a scale asking you to judge whether the image represents Psychology as a Major. The scale is: A=Obviously Psychology, B=Psychology, C=Can’t Tell, D=Not Psychology, E=Obviously not Psychology. Each image will appear for 6 seconds. Please decide on your rating, record the rating on the Scantron form and look up for the next image as quickly as possible. To help you keep track of the images each image will be preceded by a slide that shows the number for the image.”

Each group of images were divided by major category and presented collectively. Between each group of major images, the instructions changed to include the following major (such as “The following slide will use a scale asking you to judge whether the image represents Music as a Major.”) as did the scale (such as “A=Obviously Music”). Each image was present for 6 seconds. After the 100 images were rated on content in divided groups, they were presented as a whole in a random order to be rated on valence. The instructions for rating the images on valence are as follows:

“The following slide will use a scale asking you to judge whether the image is positive or negative. The scale is: A=Very Positive, B=Positive, C=Neutral, D=Negative, and E=Very Negative.”

The participants were debriefed and thanked for their participation.

## Appendix H

### Instruction for the Procedure

#### *Instructions for the AMP*

Following these instructions, there will be a brief video containing triads consisting of a warning picture, a picture of a Chinese pictograph, and image of a numbered blue square. I am interested in your judgment of the Chinese pictograph. The warning picture precedes the Chinese pictograph to ensure you are looking in the appropriate location to see the Chinese pictograph. To make sure that you are looking at the screen before the warning picture appears a tone will sound one second before the warning picture. The numbered blue square follows the Chinese pictograph to remind you where you should mark on your Scantron form. I want you to rate the Chinese pictograph as the following:

A = “much more pleasing than average”

B = “more pleasing than average”

D = “less pleasing than average”

E = “much less pleasing than average”

It is important to note that having seen a positive picture can sometimes make you judge the Chinese pictograph more positively than you otherwise would. Likewise, having just seen a negative picture can make you judge the Chinese pictograph more negatively. Because we are interested in studying how people make quick judgments please ignore this bias. **Please try your best not to let the warning pictures bias your judgment of the Chinese pictograph.** Give us an honest assessment of the Chinese pictographs, regardless of the picture that precedes them.

To make sure that you are ready we will present ten practice trials. Please mark your responses for these ten practice trials on the Scantron form in the bottom section on the back side of the Scantron beginning with item 151. Are there any questions before you practice?

#### *Instructions for the AMSS and the statement “I am satisfied with my academic major”*

Following these instructions are seven statements with which you may agree or disagree. Using the 1-5 scale below, indicate your agreement with each item by marking the appropriate letter on your Scantron. Please respond openly and as accurately and honestly as possible. The 5 point scale is:

- a. Strongly disagree
- b. Disagree
- c. Neither disagree or agree
- d. Agree
- e. Strongly agree

Each statement will be read aloud to you. Please mark your response on your Scantron in accordance to the number posted with each statement. Are there any questions before we proceed?

*Instructions for the demographics*

After signing the consent form but prior to beginning the procedure:

Do not write your name or identification number on your Scantron. Please fill out the bubbles in accordance to the letters written in the space labeled “name” on the top left of the sheet. Once you have completed this, please fill out the appropriate spaces on the Scantron on the bottom left of the sheet where gender, birth date and year in school (13=freshman, 14=sophomore, 15=junior, 16=senior) are provided.

Following the explicit measures:

Following these instructions are eleven questions regarding your demographics (information about you that is important to the examination of the results of this study). Please answer each question openly and as accurately and honestly as possible. Each question and corresponding answer will be read aloud to you. Please mark your response on your Scantron in accordance to the number posted with each question. Are there any questions before we proceed?

Figure 1

## Implicit Attitudes towards Major Disciplines in the AMP

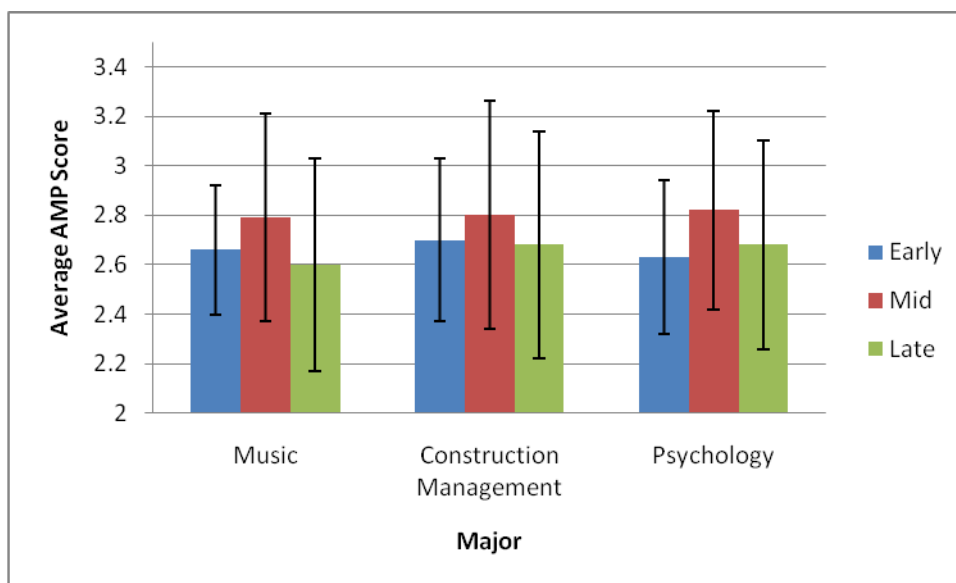




Figure 2

Attitudes towards Psychology as measured  
with the AMSS and the AMP

